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Texas Agricultural Extension Service

SUGGESTIONS FOR CHEMICAL WEED AND BRUSH CONTROL ON RANGELAND

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Suggestions for Chemical Weed and Brush Control on Rangeland

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Millions of acres of Texas rangeland support an excessive cover of undesirable woody plants and forbs. Dense stands of brush and weeds use valuable water for growth, reduce grass production and result in soil erosion. These noxious plants must be managed effectively for rangelands to reach their productive potential. Use of herbicides provides an effective and efficient alternative to controlling brush and weeds for improvement and maintenance of rangelands in a highly productive condition.

This publication lists current suggestions for herbicide use to control brush and weeds on rangeland. Some herbicides provide a high degree of control of certain species; however, seldom is a species eradicated. Consider other potential rangeland uses when developing a brush management program. Many trees, shrubs and forbs are valuable as food and cover for wildlife and may be an important component in livestock diets. Therefore, a brush management program should provide for use of control methods that give optimum benefits to livestock and wildlife.

Properly used herbicides are effective and safe. Misuse can result in poor brush and weed control and possible hazards associated with herbicidal drift or residues such as killing of desirable plants. Listed below are points to follow for proper herbicide use:

- Identify the weed or brush species and evaluate the need for control.
- Consider expected benefits, costs and alternative control practices.
- Select and purchase the suggested herbicide for the weed or brush species.
- Provide and require the use of proper safety equipment.
- Calibrate spray equipment.
- Mix herbicides in a ventilated area, preferably outside.
- Spray under conditions to minimize drift to susceptible crops.
- Apply the herbicide at the suggested rate and time.
- Keep a record of the herbicide used, the time required to spray, weather conditions, rate of herbicide in carrier, date and location and the person using the herbicide.

The sprayer used must apply the correct quantity of herbicide mixture to a specific area. To calibrate spray equipment, see Extension publication MP-1289 *Using Pesticides—Private Applicator Manual.* For information on mixing herbicides, see L-1839 *Mixing Instructions for Liquid Herbicides.*

Suggestions on use of herbicides made by the Texas Agricultural Extension Service are based upon effectiveness under Texas conditions.

Broadcast and individual plant treatments are presented in table 2. Individual plant treatments are suited for control of thin stands of brush and selective control. Broadcast treatments are useful for dense stands of brush and for weed control.

Suggested herbicides must be registered and labeled for use by the Environmental Protection Agency. *Because the status of herbicide label clearance is subject to change, be certain that the herbicide is currently labeled for the intended use.*

The user is always responsible for the effects of herbicide residue on his livestock and crops, as well as for problems that could arise from drift or movement of the herbicide from his property to that of others. *Always read and follow carefully the instructions on the container label.*

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Table 1. Index to controls for weed and brush species (if a species name is found on the same page several times, that page number will be listed several times by the plant name).

Common name of weed species	Location of control description: Individual plant or spot treatment	Broadcast treatment
Berlandier lobelia	5	5
Bitter sneezeweed	5	5
Broomweed (annual or common)	5	5
Broom snakeweed	5,6	5,6
Buffalobur	5	5
Bullnettle	7	7
Camphorweed	5	5
Carolina horsenettle	7	7
Cocklebur	5	5
Common goldenweed	7,8	7,8
Croton	5	5
Dogfennel	7	7
Drummond's goldenweed	7,8	7,8
Garbancillo	8	8
Gray goldaster	9	9
Horehound	5	5
Marshelder	5	5
Narrowleaf goldaster	9	9
Perennial broomweed	5,6	5,6
Prairie gerardia	5	5
Ragweed	5	5
Rosin weed	7	7
Silverleaf nightshade	7	7
Smartweed	5	5
Spiny aster	9,10	9,10
Sulfaweed	5	5
Sumpweed	5	5
Sunflower	5	5
Thistles	5	5
Threadleaf groundsel	8	8
Treadsalve	7	7
Upright prairie-coneflower	7	7
Western bitterweed	5	5
Western horsenettle	7	7
Western ragweed	5	5
Wolfweed	9,10	9,10
Woolly locoweed	8	8
Yankeeweed	7	7

Common name of brush species	Location of control description: Individual plant treatment	Broadcast treatment
Ashe juniper	10,10	
Baccharis	10	10
Beebrush	11,21	21
Bee-bush	11,21	21
Bigelow shinoak	11	11
Blackbrush	11,19	11,19
Blackgum	11,12	
Blackjack oak	11,11,11	11
Blueberry cedar	10,10	
Bois d'arc	11	
Catclaw acacia	19	19
Catclaw mimosa	12	12
Cenizo	12	12
Chinese tallowtree	12,13	12
Cholla	10	
Common persimmon	13,13	13
Creosotebush	13	13
Dog cactus	10	
Dryland willow	10	10
Eastern persimmon	13,13	13
Eastern redcedar	13	
Elm	11,13	
Flameleaf sumac	14	14
Granjeno	13,19	19
Greenbriar	14	
Hackberry	11,11,13	
Hardwoods	12,15	
Huisache	13,15,17,19	15,19
Locust	11	
Lotebush	11,14	
Macartney rose	16,16	16,16
Mesquite	17,17,17,18,19	17,19
Mohrs shinoak	19	19
Poison ivy	11	
Poison oak	11	
Post oak	11,11,11	11
Pricklyash	11,14	
Pricklypear	19,20	19,20
Red oak	11	
Redberry cedar	10,20	
Redberry juniper	10,20	
Retama	15,19	15,19
Roosevelt willow	10	10
Running live oak	21	21
Sand sagebrush	21	21
Sand shinnery oak	21	21
Sassafras	13	
Seep willow	10	10
Skunkbush	19	19
Spiny hackberry	13	
Sumac	11	
Sweetgum	11	
Tarbush	13	13
Tasajillo	10,19	19
Twisted acacia	19	19
White shinoak	11	11
Whitebrush	11,21	21
Whitethorn acacia	12	12
Willow	11	
Willow baccharis	10	10
Winged elm	11,11	11
Yaupon	14	
Yucca	22	

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush.

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Berlandier lobelia, bitter sneezeweed, broomweed (annual or common), buffalobur, camphorweed, cocklebur, croton, horehound, marshelder (sumpweed, sulfaweed), prairie gerardia (see remarks), ragweed, smartweed, sunflower, thistles, Western bitterweed (see remarks), Western ragweed and others	2,4-D amine or low volatile ester	1 pt to 1 qt (1/2 to 1 lb) 4 lb/gal product	1 gal (4 lb) 4 lb/gal product	2 to 4 gal water for aerial spray; 10 to 25 gal for ground broadcast application. Add surfactant as needed.	Spring, weed 4 to 6 in high, good moisture conditions.	Use 2,4-D amine in areas with 25 in rainfall or more. Use 2,4-D low volatile ester in drier areas where no susceptible crops are nearby.
	or	or	or			For Western bitterweed control, use 2,4-D low volatile ester or amine at 1 qt/acre before plants flower and temperature (above 72° F.) and soil moisture favor plant growth. When three-fourths of plants are blooming and/or temperature is less than 60° F., use Weedmaster, 2,4-D plus Banvel, Grazon P+D or 2,4-D plus Grazon PC.
	Weedmaster	1 pt to 1 qt (1/2 to 1 lb)	1 gal (4 lb)	Thoroughly wet foliage for individual plant treatment		
	or	or	or			For prairie geradia control use 1 1/2 qt/acre of 2,4-D or the low rate of Weedmaster, Banvel plus 2,4-D, Grazon P+D or Grazon PC plus 2,4-D when plants are 4-6 in high; use 1 qt/acre of Grazon P+D or 1/2 pt of Grazon PC plus 1 pt of 2,4-D/acre when plants are 6 to 10 in high before flowering.
	Tank mix Banvel with 2,4-D amine or low volatile ester	1/4 to 1/2 pt (1/8 to 1/4 lb) Banvel + 3/4 to 1 1/2 pt (3/8 to 3/4 lb) 2,4-D, 4 lb/gal product	1 qt (1 lb) Banvel + 3 qt (3 lb) 2,4-D, 4 lb/gal product			
	or	or	or			
	Grazon P+D	1 pt to 1 1/2 qt (.3 to .9 lb)	1 gal (2.5 lb)			
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1/4 to 3/4 pt (1/16 to 3/16 lb) Grazon PC + 1/2 to 1 1/2 pt (1/4 to 3/4 lb) 2,4-D, 4 lb/gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Broom snakeweed (perennial broomweed)	Grazon PC	1 pt to 1 qt (1/4 to 1/2 lb)	2 qt (1 lb)	2 to 4 gal oil-in-water	During and after full flower stage	Add emulsifer to oil for proper emulsion when oil-in-water

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
	or	or	or	(1 pt to 2 qt diesel fuel oil and water to make 2 to 4 gal/acre) or 2 to 4 gal of water with 8 to 32 oz of surfactant per 100 gal water as aerial spray or 10 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 10 to 25 gal/acre) or 10 to 25 gal of water with 8 to 32 oz of surfactant per 100 gal water as ground broadcast. Thoroughly wet foliage for individual plant treatment.	in fall when growth conditions are good or spring during peak plant growth when growth conditions are good	emulsion is used. Use 1 pt/acre of Grazon PC only in the fall. Use 1 qt/acre of Grazon PC in the spring. Poor control may be expected if Weedmaster or Banvel: 2,4-D mixture is used when growth conditions are less than ideal. Growth conditions should be optimum if Grazon P+D or Grazon PC: 2,4-D mixture is used in the spring.
	Grazon P+D	2 qt (1 1/4 lb)	1 gal (2.5 lb)			
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1 pt (1/4 lb) Grazon PC + 1 pt to 1 qt (1/2 to 1 lb) 2,4-D, 4 lb/gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product			
	or	or	or			
	Weedmaster	1 qt (1 lb)	1 gal (4 lb)			
	or	or	or			
	Tank mix Banvel with 2,4-D amine or low volatile ester	1/2 pt (1/4 lb) Banvel + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/gal product	1 qt (1 lb) Banvel + 3 qt (3 lb) 2,4-D, 4 lb/gal product mixed with 8 to 32 oz of surfactant as needed for wetting and water to make 100 gal of mixture			
	or	or	or			
	Spike 20P	3.75 lb of pellets (3/4 lb)	1/6 oz of pellets (1/30 oz) per 100 sq ft		Any time during year; optimum period is October 1 to April 1 except in Trans-Pecos optimum period is May 1 to July 1	Use only on sand, loamy sand, sandy loam, loam, silt loam, silt or sandy clay loam soils.

Bullnettle, Carolina horsenettle, dogfennel, silverleaf nightshade, upright prairie-coneflower, western horsenettle (treadsalve), yankeeweed (rosin weed)	Grazon P+D	1 to 1 1/2 qt (.6 to .9 lb)	1 gal (2.5 lb)	2 to 4 gal water for aerial spray; 10 to 25 gal for ground broadcast application. Add surfactant as needed. Thoroughly wet foliage for individual plant treatment.	Spring (see remarks)	Spray bullnettle, Carolina horsenettle, silverleaf nightshade and western horsenettle when plants begin to flower in the spring. Spray dogfennel and yankeeweed when plants are 8 to 10 in tall. Spray upright prairie-coneflower when plants are 2 to 6 in tall before flowering.
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1/2 to 3/4 pt (1/8 to 3/16 lb) Grazon PC + 1 to 1 1/2 pt (1/2 to 3/4 lb) 2,4-D, 4 lb/gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product			
	or	or	or			
	Weedmaster	1 qt (1 lb)	1 gal (4 lb)			
	or	or	or			
	Tank mix Banvel with 2,4-D amine or low volatile ester	1/2 pt (1/4 lb) Banvel + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/gal product	1 qt (1 lb) Banvel + 3 qt (3 lb) 2,4-D, 4 lb/gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Common goldenweed, Drummond's goldenweed	2,4-D low volatile ester	2 qt (2 lb) 4 lb/gal product	2 gal (8 lb) 4 lb/gal product	At least 4 gal oil-in-water emulsion as aerial spray (1 qt to 1 gal diesel fuel oil and water to make 4 gal/acre) or 4 gal of water with 8 to 32 oz of surfactant per 100 gal of water. At least 20 gal oil-in-water emulsion (1 gal diesel fuel oil and water to make 20 gal/acre) or 20 gal of	Spring when growth conditions are good	Grazon P+D, Weedmaster and mixtures of Banvel: 2,4-D and Grazon PC: 2,4-D are more effective than 2,4-D alone when growth conditions are less than optimal. When oil-in-water emulsion is used, add emulsifier to oil for proper emulsion.
	or	or	or			
	Weedmaster	3 pt (1 1/2 lb)	1 1/2 gal (6 lb)			
	or	or	or			
	Tank mix Banvel with 2,4-D amine or low volatile ester	3/4 pt (3/8 lb) Banvel + 2 1/4 pt (1.125 lb) 2,4-D, 4 lb/gal product	1 1/2 qt (1 1/2 lb) Banvel + 4 1/2 qt (4 1/2 lb) 2,4-D, 4 lb/gal product			
	or	or	or			

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method (*active ingredient rate in parenthesis*) Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
	Grazon P+D	3 pt (0.94 lb)	2 gal (5 lb)	water with 8 to 32 oz of surfactant per 100 gal water as ground broadcast. Thoroughly wet foliage for individual plant treatment.		
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	3/4 pt (0.19 lb) Grazon PC + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/ gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture	2 qt (1 lb) Grazon PC + 1 gal (4 lb) 2,4-D, 4 lb/ gal product			
Garbancillo, thread-leaf groundsel, woolly locoweed	Grazon P+D	3 pt (0.94 lb)	2 gal (5 lb)	2 to 4 gal water for aerial spray; 10 to 25 gal for ground broadcast application. Add surfactant as needed. Thoroughly wet foliage for individual plant treatment.	Fall, good moisture conditions	Herbicide application may increase palatability of these poisonous plants. Therefore, treated areas should not be grazed until the toxic plants dry up and lose their palatability.
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	3/4 pt (0.19 lb) Grazon PC + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/ gal product	2 qt (1 lb) Grazon PC + 1 gal (4 lb) 2,4-D, 4 lb/ gal product			
	or	or	or			
	Weedmaster	1 qt (1 lb)	1 1/2 qt (6 lb)			
	or	or	or			
	Tank mix Banvel with 2,4-D amine or low volatile ester	3/4 pt (3/8 lb) Banvel + 2 1/4 pt (1 1/8 lb) 2,4-D, 4 lb/ gal product mixed with 8 to 32 oz surfactant as	1 1/2 qt (1 1/2 lb) Banvel + 4 1/2 qt (4 1/2 lb) 2,4-D, 4 lb/ gal product			

			needed for wetting and water to make 100 gal of mixture			
Gray goldaster, narrowleaf goldaster	2,4-D low volatile ester	1 qt (1 lb)	1 gal (4 lb)	2 to 4 gal oil-in-water emulsion (2 qt of diesel fuel oil and water to make 2 to 4 gal/acre) as aerial spray.	Spring during bud stage (pre-bloom)	Bud stage usually occurs during mid-May to early June.
	or	or	or			
	Grazon P+D	1.6 qt (1 lb)	1 gal (2.5 lb)			
	or	or	or			
	Tank mix Grazon PC with 2,4-D low volatile ester	0.8 pt (0.2 lb) Grazon PC + 0.8 qt (0.8 lb) 2,4-D, 4 lb/ gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/ gal product	10 to 25 gal oil-in-water emulsion (1 gal diesel fuel oil and water to make 10 to 25 gal/ acre) as ground broadcast		
	or	or	or			
	Weedmaster	1 qt (1lb)	1 gal (4 lb)			
	or	or	or	Thoroughly wet foliage for individual plant treatment.		
	Tank mix Banvel with 2,4-D low volatile ester	1/2 pt (1/4 lb) Banvel + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/ gal product	1 qt (1 lb) Banvel + 3 qt (3 lb) 2,4-D, 4 lb/ gal product mixed with 16 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Spiny aster (wolfweed)	Grazon P+D	1 qt (0.63 lb)	1 gal (2.5 lb)	10 to 25 gal water for ground broad-cast. Add surfactant as needed. Thoroughly wet foliage for individual plant treatment.	Spring, good moisture and growth con-ditions	Shred plants during winter. Regrowth will have leaves. Apply herbicide when regrowth is 10 to 12 in tall.
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1/2 pt (1/8 lb) Grazon PC + 1 pt (1/2 lb) 2,4-D, 4 lb/ gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/ gal product			
	or	or	or			
	Weedmaster	1 qt (1 lb)	1 gal (4 lb)			
	or	or	or			

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
	Tank mix Banvel with 2,4-D amine or low volatile ester	1/2 pt (1/4 lb) Banvel + 1 1/2 pt (3/4 lb) 2,4-D, 4 lb/ gal product	1 qt (1 lb) Banvel + 3 qt (3 lb) 2,4-D, 4 lb/ gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Ashe juniper (blueberry cedar)	Velpar RP or Grazon PC		2 ml per 3 ft of height or canopy diameter or 4 ml per 3 ft of height or canopy diameter		Late winter to mid-spring	Apply undiluted Velpar RP or Grazon PC to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use Velpar RP on marshy or poorly drained sites nor on soils classified as clays.
Ashe juniper (blueberry cedar), cholla, dog cactus, redberry juniper (redberry cedar), tasajillo	Grazon PC		2 qt (1 lb) per 100 gal of oil-in-water emulsion (80 gal of water + 19 1/2 gal of diesel fuel oil) or 16 to 32 oz of surfactant plus water to make 100 gal of mixture	Thoroughly wet foliage and stems or pads and stems.	Anytime	When using oil-in-water emulsion, use emulsifier added to oil for proper emulsion.
Baccharis (dryland willow, Roosevelt willow, seep willow or willow baccharis)	2,4-D low volatile ester	3 to 4 pt (1 1/2 to 2 lb) 4 lb/gal product	3 qt (3 lb) 4 lb/gal product mixed with 8 to 32 oz of surfactant for wetting and water to make 100 gal of mixture	4 to 5 gal water for aerial spray; 15 to 20 gal water for ground broadcast. Add surfactant. Thoroughly wet the entire foliage, stems and trunks for	Spring	Individual plant treatment with 2,4-D may be applied anytime during the growing season when soil moisture is available for active growth. However, spring treatment provides best control.

	or	or		individual plant treatment		
	2,4-D low volatile ester	3 qt (3 lb) 4 lb/gal product			Fall	
	or		or			
	Velpar RP		2 ml per 3 ft of height or canopy diameter		Late winter to mid-spring	Apply undiluted Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use on marshy or poorly drained sites nor on soils classified as clays.
Bigelow shinoak (white shinoak)	Spike 20P	7.5 lb of pellets (1 1/2 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft		Anytime during year ; optium period is Oct. 1 to April 1.	For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Blackbrush	Spike 20P	10 to 15 lb pellets (2 to 3 lb)	1/2 oz of pellets (1/10 oz) per 45 sq ft or 2 to 4 in of stem diameter		Anytime during year ; optimum period is Oct. 1 to to April 1.	Use higher rate on deep soils with higher clay content. For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Blackjack oak, hackberry, locust, poison ivy, poison oak, post oak, red oak, sumac	Ammate X-NI		1 tsp crystals per cup of water or 3 lb crystals per 1 gal water or 1 tbsp crystals/ in of base	Apply to freshly cut surface of stump.	Fall and winter	Wash metal container after use because ammate corrodes.
Blackjack oak, bois d'arc, elm, hackberry, lotebush, post oak, pricklyash, whitebrush (beebrush, bee-bush), willow, winged elm	Velpar RP		4 ml per 1 in stem diameter or 3 ft of canopy diameter		Late winter to mid-spring	Apply undiluted Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use on marshy or poorly drained sites nor on soils classified as clays.
Blackjack oak, post oak, winged elm	Spike 20P	10 lb of pellets (2 lb)	1/2 oz of pellets (1/10 oz) per 45 sq ft or 2 to 4 in of stem diameter		Anytime during year ; optimum period is Oct. 1 to April 1.	For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Blackgum, sweetgum	Ammate X-NI		4 lb crystals	Apply to freshly	Fall and winter	Wash metal container after use

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
and other hardwoods			(3.8 lb) per 1 gal of water	cut surface of stump		because ammate corrodes.
	or		or			
	Crossbow		4 gal (12 lb) mixed with 96 gal diesel fuel oil		Anytime, best results when soil is dry	
Catclaw mimosa, white-thorn acacia	Spike 20P	3.75 lb of pellets (3/4 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft or 2 to 4 in of stem diameter		Anytime during year; optimum period is May 1 to July 1.	Use only when brush is growing on sandy, loamy sand or sandy loam soil. For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Cenizo	Spike 20P	3.75 lb of pellets (3/4 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft		Anytime during year; optimum period is Oct. 1 to April 1.	For individual plant treatment apply the pellets evenly on soil under the plant canopy and 1 ft beyond canopy edge.
Chinese tallowtree	Grazon P+D	1 gal (2.5 lb)	1 gal (2.5 lb)	10 to 25 gal for ground broadcast application. Add 8 to 32 oz of surfactant per 100 gal water. Thoroughly wet foliage for individual plant treatment.	Spring or fall	
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/ gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/ gal product			
	or	or	or			
	Grazon PC or	1 qt (1/2 lb) or	2 qt (1 lb) or			
	Tank mix Grazon PC with Grazon ET	1 qt (1/2 lb) Grazon PC + 1 pt (1/2 lb) Grazon ET	2 qt (1 lb) Grazon PC + 1 qt (1 lb) Grazon ET mixed with 8 to 32 oz surfactant as			

			needed for wetting and water to make 100 gal of mixture			
	or		or			
	Velpar RP		4 ml per 1 in of stem diameter or 3 ft of canopy diameter		Late winter to mid-spring	Apply Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Apply Spike 20P evenly on the soil under the plant canopy and 1 ft beyond canopy edge. Do not use Velpar RP on marshy or poorly drained sites nor on soils classified as clays.
	or		or			
	Spike 20P		1/2 oz of pellets (1/10 oz) per 45 sq ft or 2 to 4 in of stem diameter		Anytime during year ; optimum period is Oct. 1 to April 1.	
Common or Eastern persimmon, sassafras	Ammate X-NI		3 lb crystals (2.85 lb) per 1 gal or water	Apply to freshly cut surface of stump	Spring and summer	Wash metal container after use because ammate corrodes.
Common or Eastern persimmon	Banvel	2 qt (2 lb)	1 gal (4 lb) mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture	Ground broadcast 15 to 20 gal water. Add surfactant as needed. Thoroughly wet foliage for individual plant treatment.	Spring, leaves fully developed	
Creosotebush, tarbush	Spike 20P	3.75 to 5 lb of pellets (3/4 to 1 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft		Anytime during year ; optimum period is May 1 to July 1.	Use 5 lb of pellets/acre when soil is a loam, silt loam, silt or sandy clay loam. Use low rate when soil is a sand, loamy sand or sandy loam. Do not treat mountain side or gravelly ridges with slopes of 7% or more. For individual plant treatment apply pellets evenly on soil under the plant canopy and 1 ft beyond the canopy edge.
Eastern redcedar	Grazon PC		4 ml per 3 ft of height		Spring or fall	Apply undiluted Grazon PC or Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use Velpar RP on marshy or poorly drained sites nor on soils classified as clays.
	or		or			
	Velpar RP		4 ml per 1 in of stem diameter or 3 ft of height		Late winter to mid-spring	
Elm, granjeno (spiny hackberry), hackberry, huisache,	Spike 20P		1/2 oz of pellets (1/10 oz) per 45 sq ft or		Anytime during year ; optimum period is Oct. 1 to	Apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
lotebush, pricklyash, yaupon			2 to 4 in of stem diameter		April 1 except in Trans-Pecos where optimum period is May 1 to July 1.	
Flameleaf sumac	Grazon P+D		1 gal (2.5 lb)	2 to 4 gal of oil-in-water emulsion (1 pt to 2 qt diesel fuel oil and water to make 2 to 4 gal/acre) or 2 to 4 gal of water with 8 to 32 oz of surfactant per 100 gal water as aerial spray or 10 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 10 to 25 gal/acre) or 10 to 25 gal of water with 8 to 32 oz of surfactant per 100 gal water as ground broadcast. Thoroughly wet foliage for individual plant treatment.	Late spring, leaves mature	
	or		or			
	Grazon PC	1 to 2 pt (1/4 to 1/2 lb)	2 qt (1 lb)			
	or	or	or			
	Tank mix Grazon PC with Grazon ET	1 pt (1/4 lb) Grazon PC + 1/2 pt (1/4 lb) Grazon ET	1 qt (1/2 lb) Grazon PC + 1 pt (1/2 lb) Grazon ET			
	or		or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester		1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Greenbriar	Tank mix Banvel with 2,4-D low volatile ester		1 1/2 gal (6 lb) Banvel + 3 gal (12 lb) 2,4-D, 4 lb/gal product mixed with 95 1/2 gal of diesel fuel oil or	Thoroughly wet stems	Winter	Use as dormant stem treatment.

			2 oz (1/10 lb) Banvel + 4 oz (1/8 lb) 2,4-D, 4 lb/gal product mixed with 1 gal of diesel fuel oil			
Hardwoods with a diameter more than 1 in except mesquite and huisache	2,4-D amine		Undiluted	Use tree injector or other injecting equipment. Apply in cuts spaced 2 in apart at base of trees. Apply until 2,4-D runs from each end of cut.	Summer or winter	
Huisache, retama	Tank mix Grazon PC with Grazon ET	1 qt (1/2 lb) Grazon PC + 1 pt (1/2 lb) Grazon ET	2 qt (1 lb) Grazon PC + 1 qt (1 lb) Grazon ET	4 gal oil-in-water emulsion as aerial spray (1 qt to 1 gal diesel fuel oil and water to make 4 gal/acre); 20 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 20 to 25 gal/acre) or 20 to 25 gal water plus surfactant/acre as ground broadcast For individual plant treatment wet foliage thoroughly when water is used as carrier. When oil-in-water emulsion is used, wet foliage to glisten but do not wet until herbicide drips.	Spring, with mature foliage or fall with good soil moisture and foliage	When using oil-in-water emulsion, use emulsifier added to oil for proper emulsion.
	or	or	or			
	Tank mix Grazon PC with Reclaim	1 qt (1/2 lb) Grazon PC + 1/3 to 2/3 qt (1/4 to 1/2 lb) Reclaim	2 qt (1/2 lb) Grazon PC + 1 1/3 qt (1 lb) Reclaim			
	or	or	or			
	Grazon PC	1 qt (1/2 lb)	2 qt (1 lb) Grazon PC mixed with 80 gal of water plus sufficient diesel fuel oil to make a total volume of 100 gal or Mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Macartney rose (mowed and other disturbed stands within 3 yr of disturbance)	2,4-D amine	2 qt (2 lb) 4 lb/gal product	1 gal (4 lb) 4 lb/gal product	5 to 15 gal water as aerial spray; 25 to 30 gal water as ground broadcast. Add 8 to 32 oz surfactant/100 gal depending on hardness of water. Thoroughly wet foliage and stems for individual plant treatment.	Spring before June 1, good growth conditions	Avoid spraying earlier than 9 to 12 months following mowing or when plants have high percentage of new growth. Poor control may be expected if plants are less than 3 ft tall when sprayed. Repeat treatment when necessary. Apply in swathwidth to obtain complete coverage on all plants.
	or	or	or			
	Grazon P+D	1 gal (2.5 lb)	1 gal (2.5 lb)		Spring or fall, good growing conditions	
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product		Spring or fall, good growing conditions	
	or	or	or			
	2,4-D low volatile ester	2 qt (2 lb) 4 lb/gal product	1 gal (4 lb) 4 lb/gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture		Fall, under good moisture conditions, before Nov. 1	
Macartney rose (undisturbed stands)	2,4-D amine	1 gal (4 lb) 4 lb/gal product	1 gal (4 lb) 4 lb/gal product	5 to 15 gal water plus 8 to 32 oz surfactant/100 gal as aerial spray	Spring, before June 1, good growth conditions	
	or	or	or			
	Grazon P+D	1 gal (2.5 lb)	1 gal (2.5 lb)		Spring or fall, good growth conditions	
	or	or	or			
	Tank mix Grazon PC with 2,4-D amine or low volatile ester	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product	1 qt (1/2 lb) Grazon PC + 2 qt (2 lb) 2,4-D, 4 lb/gal product		Spring or fall, good growth conditions	

	or	or	or			
	2,4-D low volatile ester	3 qt (3 lb) 4 lb/gal product	1 gal (4 lb) 4 lb/gal product mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture		Fall, under good moisture conditions before Nov. 1	
Mesquite, huisache	Diesel fuel oil, kerosene			Apply to base of trunk from 12 to 18 in above soil surface down to soil surface. Apply until solution puddles on soil surface.	Anytime soil is dry and pulled away from the trunk	Apply sufficient oil to penetrate to plant bud zone. Diesel fuel oil does not evaporate as fast as kerosene.
	or					
	Velpar RP		4 to 8 ml per 3 ft of canopy diameter or 1 in of stem diameter at breast height		Late winter to mid-spring	Apply undiluted Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use on marshy or poorly drained sites nor on soils classified as clays.
Mesquite	Grazon ET		2 gal (8 lb) mixed with 98 gal diesel fuel oil or 8 oz (1/4 lb) mixed with 3 gal diesel fuel oil	Apply to base of trunk from 12 to 18 in above soil surface down to soil surface. Apply until solution puddles on soil surface.	Anytime soil is dry and pulled away from trunk	Apply to base of plant until solution runs to ground line.
Mesquite	Grazon ET	1 pt to 1 qt (1/2 to 1 lb)	3 qt (3 lb)	2 to 4 gal oil-in-water emulsion as aerial spray (1 pt to 1 gal diesel fuel oil and water to make 2 to 4 gal/acre); 20 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 20 to 25 gal/acre) as ground broadcast	Spring, 40 to 90 days after bud break	Use 1 qt/acre of Grazon ET or Banvel where 1 pt/acre has not provided successful control under good conditions. Use 1 pt/acre Grazon PC plus 1/2 pt/acre Grazon ET, 1/2 pt/acre Banvel plus 1/2 pt/acre Grazon ET, 1 pt/acre Grazon PC plus 1/2 pt/acre Banvel, 1 pt/acre Grazon PC plus 1/3 qt/acre Reclaim and 1/3 qt/acre Reclaim only in West Texas. Banvel and Banvel mixtures have been more effective in West Texas than in other parts of the state. Mixtures with Grazon PC or Banvel will control many weeds. When using oil-in-water emulsion, use emulsifier added to oil for proper emulsion.
	or	or	or			
	Banvel	1 pt to 1 qt (1/2 to 1 lb)	3 qt (3 lb)			
	or	or	or			
	Reclaim	1/3 qt to 2/3 qt (1/4 to 1/2 lb)	2/3 gal (2 lb)			
	or	or	or			
	Tank mix Grazon ET with Grazon	1/2 to 1 pt (1/4 to 1/2 lb)	1 qt (1 lb) Grazon ET	For individual plant treatment,		

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
	PC	Grazon ET + 1 to 2 pt (1/4 to 1/2 lb) Grazon PC	+ 2 qt (1 lb) Grazon PC	wet foliage thoroughly when water is used as carrier. When oil-in-water emulsion is used, wet foliage to glisten but do not wet until herbicide drips.		
	or	or	or			
	Tank mix Grazon ET with Banvel	1/2 to 1 pt (1/4 to 1/2 lb) Grazon ET + 1/2 to 1 pt (1/4 to 1/2 lb) Banvel	3 pt (1 1/2 lb) Grazon ET + 3 pt (1 1/2 lb) Banvel			
	or	or	or			
	Tank mix Grazon PC with Banvel	1 to 2 pt (1/4 to 1/2 lb) Grazon PC + 1/2 to 1 pt (1/4 to 1/2 lb) Banvel	2 qt (1 lb) Grazon PC + 1 qt (1 lb) Banvel			
	or	or	or			
	Tank mix Grazon PC with Reclaim	1 to 2 pt (1/4 to 1/2 lb) Grazon PC + 1/3 to 2/3 qt (1/4 to 1/2 lb) Reclaim	2 qt (1 lb) Grazon PC + 1 1/3 qt (1 lb) Reclaim mixed with 80 gal of water plus sufficient diesel fuel oil to make a total volume of 100 gal or mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Mesquite	Grazon PC		1 gal (2 lb)	Applied with a	Spring, 40 days	Mesquite should be less than 6 ft

				carpeted roller	after bud break through August. Best control is during 40 to 90 days after bud break.	tall and should pass under carpeted roller without breaking the main stem.
	or		or			
	Reclaim		2/3 gal (2 lb)			
	or		or			
	Tank mix Grazon PC with Reclaim		2 qt (1 lb) Grazon PC + 1 1/3 qt (1 lb) Reclaim mixed with 1 oz surfactant and water to make 8 gal of mixture			
Mixed brush (blackbrush, catclaw acacia, granjeno, huisache, mesquite, pricklypear, retama, skunkbush, tasajillo, twisted acacia)	Tank mix Grazon PC with Grazon ET	2 pt (1/2 lb) Grazon PC + 1 pt (1/2 lb) Grazon ET	2 qt (1 lb) Grazon PC + 1 qt (1 lb) Grazon ET	4 gal oil-in-water emulsion as aerial spray (1 qt to 1 gal diesel fuel oil and water to make 4 gal/acre); 20 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 20 to 25 gal/acre) as ground broadcast.	Spring, 40 to 90 days after bud break. If mesquite has 10% canopy cover or less, application may be made in spring or fall.	The mixture of 1 qt Grazon PC plus 2/3 qt Reclaim will usually provide better results than the 1 qt Grazon PC plus 1/3 qt Reclaim mixture. Mixtures will control most weeds. When using oil-in-water emulsion, use emulsifier added to oil for proper emulsion.
	or	or	or			
	Tank mix Grazon PC with Reclaim	1 qt (1/2 lb) Grazon PC + 1/3 to 2/3 qt (1/4 to 1/2 lb) Reclaim	2 qt (1 lb) Grazon PC + 1 1/3 qt (1 lb) Reclaim			
	or	or	or	For individual plant treatment, wet foliage thoroughly when water is used as carrier. When oil-in-water emulsion is used, wet foliage to glisten but do not wet until herbicide drips		
	Tank mix Grazon PC with Banvel	2 pt (1/2 lb) Grazon PC + 1 pt (1/2 lb) Banvel	2 qt (1 lb) Grazon PC + 1 qt (1 lb) Banvel mixed with 80 gal of water + sufficient diesel fuel oil to make a total of 100 gal or mixed with 8 to 32 oz surfactant as needed for wetting and water to make 100 gal of mixture			
Mohrs shinoak	Spike 20P	5 lb of pellets (1 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft		Anytime during year; optimum period is Oct. 1 to April 1.	Use only when oak stand is predominantly Mohrs shinoak. These stands are generally found in Taylor, Nolan, Coke, Sterling and Mitchell counties.

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (continued).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
						For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Pricklypear	Grazon PC	1 pt to 1 qt (1/4 to 1/2 lb)	2 qt (1 lb) per 100 gal of oil-in-water emulsion (80 gal of water + 19 1/2 gal diesel fuel oil) or 16 to 32 oz of surfactant plus water to make 100 gal of mixture	2 to 4 gal oil-in-water emulsion as aerial spray (1 pt to 1 gal diesel fuel oil and water to make 2 to 4 gal/acre); 20 to 25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil to make 20 to 25 gal/acre) as ground broadcast or 20 to 25 gal of water/acre (with 16 to 32 oz of surfactant per 100 gal of water) as ground broadcast. For individual plant treatment thoroughly wet pads and stems.	Anytime; best results have been obtained with late summer through fall applications.	Use emulsifier added to oil for proper emulsion. Use 1 pt/acre Grazon PC only on High Plains where no brush overstory is present. Fall application will provide best results.
	or	or				
	Prescribed burn + Grazon PC	1/2 pt (1/8 lb)			After burn, before April 30 (May 31 if new pads do not develop by April 30)	Install prescribed burn some time during December through March. Sufficient fine fuel with good fuel continuity should be present to provide a uniform burn with moderate to high intensity. Spray the burned area within 5 months of the burn but no later than April 30 (May 31 if new pads do not develop by April 30).
Redberry juniper (redberry cedar)	Velpar RP		2 ml per 3 ft of height or canopy diameter		Late winter to mid-spring	Apply undiluted Velpar RP to soil surface within 3 ft of stem base. Use an exact delivery handgun applicator. Do not use on marshy or poorly

						drained sites nor on soils classified as clays.
Running live oak	Spike 20P	5 to 10 lb of pellets (1 to 2 lb)	1/2 oz of pellets (1/10 oz) per 50 to 100 sq ft		Anytime during year ; optimum period is Oct. 1 to April 1.	Use low rate on 2 to 8 ft tall brush. Use 7.5 lb of pellets/acre when brush is 2 to 8 ft tall on rolling or hummocking site and when live oak plants are 8 ft or taller without understory species such as yaupon. Use 10 lb of pellets/acre when live oak plants are taller than 8 ft and understory of yaupon and other species are present. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Sand sagebrush	2,4-D low volatile ester	1 qt (1 lb) 4 lb/gal product [up to 2 qt (2 lb) for ground broadcast]	1 gal (4 lb) 4 lb/gal product mixed with 16 to 32 oz surfactant and water to make 100 gal of mixture	4 gal oil-in-water emulsion as aerial spray (1 gal diesel fuel oil and water to make 4 gal/acre) Ground broadcast 20 to 25 gal oil-in-water emulsion (1 gal diesel fuel oil and water to make 20 to 25 gal/acre) or 20 to 25 gal of water/acre with 16 oz of surfactant per 100 gal of water. Thoroughly wet foliage for individual plant treatment.	May 1 to June 15 under good growth conditions with plants fully leafed	Do not spray when plants are defoliated by late freeze, hail or unfavorable growth conditions.
Sand shinnery oak	Spike 20P	3.75 to 5 lb of pellets (3/4 to 1 lb)	1/2 oz of pellets (1/10 oz) per 100 sq ft		Anytime during year ; optimum period is Oct. 1 to April 1.	Use 3.75 lb of pellets/acre in southern High Plains and Rolling Plains; use 5 lb of pellets/acre in eastern Panhandle north of Prairie Dog Town Fork of the Red River. For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Whitebrush (beebrush, bee-bush)	Spike 20P	5 to 7.5 lb of pellets (1 to 1 1/2 lb)	1/2 oz of pellets (1/10 oz) per		Anytime during year ; optimum	Use 5 lb of pellets/acre on sand, loamy sand or sandy loam soils.

Table 2. Herbicides for use on rangeland to control undesirable weeds and brush (concluded).

Brush or weed controlled	Herbicide (see table 3 page 23 for common and chemical names)	Herbicide quantity by application method *(active ingredient rate in parenthesis)* Broadcast rate per acre	Individual plant or spot treatment	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
			50 to 100 sq ft		period is Oct. 1 to April 1.	Use 6.25 lb of pellets/acre on soils with 20 to 30% clay. Use 7.5 lb of pellets/acre on areas with grass production greater than 1,500 lb/acre or on areas where mesquite, Texas persimmon or other woody plants have a canopy cover of 20% or more with whitebrush that is 6 ft tall or taller. For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 ft beyond canopy edge.
Yucca	Grazon ET		2 gal (8 lb) mixed with 98 gal of diesel fuel oil or 8 oz (1/4 lb) mixed with 3 gal of diesel fuel oil	Spray center of plant until solution runs to soil surface.	Anytime	Complete coverage of leaves is not necessary. The crown of the plant must be thoroughly wet with the herbicide mixture.

Table 3. Common, chemical and product names of herbicides*.

Herbicide common name	Chemical name	Product name	Active ingredient or acid equivalent
AMS	ammonium sulfamate	Ammate X-NI	95%
Clopyralid	3,6-dichloro-2-pyridinecarboxylic acid	Reclaim	3 lb/gal
2,4-D	(2,4-dichlorophenoxy) acetic acid	Several manufacturers	amine salts and esters
Dicamba	3,6-dichloro-2-methoxybenzoic acid	Banvel	4 lb/gal
Dicamba:2,4-D(1:3)	See dicamba and 2,4-D	Weedmaster	4 lb/gal
Diesel fuel oil or kerosene	refined petroleum fractions	Several manufacturers	
Hexazinone	3-cyclohexyl-6-(dimethylamino) -1-methyl-1,3,5-triazine-2,4 (IH,3H)-dione	Velpar RP	2 lb/gal
Picloram	4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid	Grazon PC	2 lb/gal
Picloram:2,4-D(1:4)	See picloram and 2,4-D	Grazon P+D	2.5 lb/gal
Tebuthiuron	N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea	Spike 20P	20%
Triclopyr	[(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid	Grazon ET	4 lb/gal
Triclopyr:2,4-D(1:2)	See triclopyr and 2,4-D	Crossbow	3 lb/gal

*Herbicides have been identified by the accepted Weed Science Society of America common name or other common designation, the correct chemical names as required on the label and where practicial, one or more product names. For herbicides marketed under three or more labels, the designation "several manufacturers" has been used rather than attempting to list all the trade formulations.

Table 4. Common measurement conversions for use with herbicide applications.

Liquid

1 gallon (gal)	= 4 quarts (qt)	1 pint (pt)	= 2 cups
1 gallon (gal)	= 8 pints (pt)	1 pint (pt)	= 16 ounces (oz)
1 gallon (gal)	= 16 cups	1 pint (pt)	= 473.12 milliliters (ml)
1 gallon (gal)	= 128 ounces (oz)	1 cup	= 8 ounces (oz)
1 gallon (gal)	= 3784.96 milliliters (ml)	1 ounce (oz)	= 2 tablespoons (tbs)
1 quart (qt)	= 2 pints (pt)	1 ounce (oz)	= 29.57 milliliters (ml)
1 quart (qt)	= 4 cups	1 tablespoon (tbs)	= 3 teaspoons (tsp)
1 quart (qt)	= 32 ounces (oz)	1 tablespoon (tbs)	= 1/2 ounce (oz)
1 quart (qt)	= 946.24 milliliters (ml)	1 tablespoon (tbs)	= 14.79 milliliters (ml)
		1 teaspoon (tsp)	= 4.98 milliliters (ml)

Weight

1 pound (lb)	= 16 ounces (oz)	1 ounce (oz)	= 28.35 grams (g)
1 pound (lb)	= 453.6 grams (g)	1 kilogram (kg)	= 2.2 pounds (lb)

Area

1 acre	= 43,560 square feet (sq ft)
1 hectare (ha)	= 2.471 acres

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

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